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ABSTRACT

The acquisition of two types of anaphora, reflexive and non-reflexive personal pronouns, was investigated. It was hypothesized that the two types of anaphora are acquired at different developmental stages. The three experiments involved Dutch children of age 6 and 7 and adults. Interpretations of sentences containing third person reflexive pronouns, sentences containing non-reflexive third person pronouns, and series of randomly arranged sentences containing either type of pronoun were tested. The 6-year-olds were unable to correctly interpret anaphoric pronouns when both types of pronouns were presented. The 7-year-olds were able to interpret reflexive pronouns but not the non-reflexive pronouns. The results provide some evidence that the discovery of the relationship between a reflexive pronoun and its antecedent is easier than that of a non-reflexive anaphoric pronoun and its antecedent. References are appended. (RW)

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CHILDREN'S INTERPRETATION OF SENTENCE-INTERNAL ANAPHORA

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1. Theoretical considerations

In this paper, we will focus on some differences between two kinds of anaphoric pronouns, i.e. pronouns that derive their referential properties from antecedents given in the linguistic context.

Certain pronouns, like he, her, etc., not only have an anaphoric use but also a deictic use. With the latter, the interpretation is determined not by the linguistic context, but by the non-linguistic one. In using a sentence like She is the smartest, for instance, it is not necessary to have a linguistic antecedent for she. Situational information can suffice, for instance, if one fixes the reference of she by pointing to someone.

There are reasons to believe that deictic and anaphoric uses of pronouns do not develop in the same way. Certain deictic pronouns, like demonstratives, are among the first words that children produce spontaneously (see Clark, 1978), although it takes several years before the full system of these pronouns is mastered (cf. Deutsch & Pechmann, 1978; Tanz, 1980). Anaphoric uses of these pronouns, however, appear only at a much later stage of development (see Karmiloff-Smith, 1981).

Although certain forms of anaphoric usage are acquired "surprisingly late", as Carol Chomsky (1969) pointed out, this relatively late development does not seem to hold for all anaphors. The reason is that anaphora itself is not a unitary phenomenon. Late development only seems to hold for anaphoric uses of personal pronouns (Karmiloff-Smith, 1981) or pronoun-like elements that are not expressed lexically, e.g., the one (Chomsky, 1969). For reflexive anaphors (for instance, himself or herself), the situation appears different (cf. Solan, 1978).

In this study we consider two kinds of anaphors -- reflexives (like herself) and non-reflexive personal pronouns (like her). Let's consider how the assignment of antecedents to such anaphors is resolved:

(1) a. Mary likes herself
    b. Mary thinks that Bill likes her

In (1a), herself is obligatorily resolved as Mary, while in (1b) resolution of her as Mary is optional. The point is that resolution of the two kinds of anaphors is dependent on entirely different principles. Resolution of reflexives is deterministic (cf. Koster,

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1978, 1979; Chomsky, 1981). Resolution of non-reflexive anaphors is in part constrained by syntactic principles, but is otherwise determined by pragmatic factors. As Partee (1978) pointed out, there are no "absolute rules governing the choice of referent for pragmatic uses of pronouns" but only "discoverable strategies and principles governing the relative likelihood or preference among choices."

In contrast to the principles of pragmatic anaphor resolution, the deterministic principles underlying the resolution of reflexives are largely known. There is considerable consensus that reflexives are connected with their antecedents in accordance with certain configurational properties such as the following:

(2) a. the connection is obligatory
b. the antecedent is unique (there are no split antecedents)
c. antecedent and anaphor are in the same (local) domain
d. the antecedent c-commands the anaphor.

2. Experimental Studies

We have tested the hypothesis that the structural differences between the two types of anaphora show up developmentally. We carried out three experiments, using sentence-picture comparison tasks in which subjects were requested to judge whether a Dutch sentence like De vader van Pieter wast zich (The father of Pieter washes himself) provided an appropriate or inappropriate description of an action depicted in a photograph. From the responses, namely either the judgment 'goed' (appropriate) or 'fout' (inappropriate) one can make inferences about the subject's interpretation of the sentence-internal anaphoric pronoun. The native speaker should only match either sentences containing reflexive pronouns to pictures of self-oriented actions and sentences with non-reflexive anaphors to pictures of other-oriented actions. The pictures depicted actions of washing, dressing, and so on, that can be done either to oneself or to others.

2.1 Experiment I: Children's interpretation of reflexive pronouns

In Experiment I, we test whether 6 year-old Dutch children have already acquired the linguistic knowledge for the correct interpretation of sentences containing 3rd person reflexive pronouns.

This experiment was also designed to study the influence of three factors on children's interpretations. (1) The first factor is the linguistic form of the pronoun: in Dutch the standard form of the third person reflexive pronoun, zich, is unmarked for gender. However, in spoken Dutch two substandard forms also occur, z'n eigen ('his own' in English) and d'r eigen ('her own' in English), that do indicate the antecedent's sex. Since these forms are more likely to occur in the input-language of our subjects and since they are presumably more frequent in their own productions, one might suppose that children acquire the appropriate knowledge for the substandard forms earlier than for the standard zich.

(2) Experiment I also takes a second factor into account, namely

the linear order in which the two possible antecedents of the anaphoric pronoun appear in the noun phrases of the sentences. In Dutch the relationship between a father and his son Pieter, for example, can be expressed by either using an NP containing a possessive construction, as in Pieter z'n vader, or a prepositional phrase as in De vader van Pieter. The variation in word order for the NPs in these two constructions allows us to ask whether interpretations of reflexive sentences depend on the linear distance between the anaphoric expressions and its antecedent within the sentence.

(3) Since the substandard forms indicate the gender of the antecedent, we must also vary the natural gender of the dyads mentioned in the noun phrases.

Results and Interpretation

The data consisted of 384 judgments of 12 six year-old children. We analyzed how often children were correct in judging a sentence as appropriate for describing a picture with an other-oriented action or as inappropriate for a picture showing the self-oriented action. Table 1 presents the relative frequencies of errors dependent on standard vs. substandard form of the reflexive pronoun, gender of the participants involved, and their order of mention in the noun phrases.

Table 1 Distribution of errors in Experiment I

Factors	Reflexive Pronoun Type		Gender		Linear Order		Response Category	
Levels	Standard	Substandard	♂	♀	Prep.	Poss.	Match	Mism.
Errors (%)	1.6	2.6	2.1	2.1	3.2	1.0	0.0	4.2

Only 8 of the 384 judgments can be counted as errors which correspond to a relative frequency of 2.1% errors. These 8 erroneous judgments all involved the mismatch response-category ('fout') where a reflexive sentence was considered an appropriate description for a picture with an other-oriented action. Because of the low error-rate in general, further statistical analysis is superfluous. There is a clear ceiling effect for correct judgments indicating that the 6 year olds in this experiment had no difficulty in interpreting the reflexive pronouns according to the grammatical rules of Dutch. Furthermore, their interpretation was not influenced by the differences in reflexive pronouns, the standard form zich vs. the substandard forms z'n eigen and d'r eigen with gender-marking. It was also not influenced by the linear order in the noun phrases, nor by the variation of the dyads of participants.

2.2 Experiment II: Children's interpretation of non-reflexive pronouns

Experiment II looked at children's interpretation of single sentences containing non-reflexive third person pronouns used anaphorically. A grammar does not specify appropriate antecedents for

non-reflexive personal pronouns in a deterministic way. However, sentences like those in Experiment I, for example, do allow precise inferences about who cannot be the antecedent of a non-reflexive pronoun. In a sentence like De vader van Pieter wast hem ('The father of Pieter washes him') it is certainly not possible to identify the referent of the pronoun hem with the agent of the action. As long as no further linguistic or non-linguistic context is provided, the sentence just mentioned offers only one reasonable antecedent for the personal pronoun, namely Pieter. But in contrast to the reflexive sentences in Experiment I, Pieter is not necessarily the antecedent of hem, but given the contextual constraints - namely strict sentence internal anaphora - it is the only one that is feasible per exclusionem.

Results and Interpretation

The main results of Experiment II are summarized in Table 2, which shows the distribution of incorrect judgments as a function of the various factors.

Table 2 Distribution of errors in Experiment II.

Factors	Non-Reflexive Pronoun	Gender		Linear Order		Response Category	
Levels	Standard	♂	♀	Prep.	Poss.	Match	Mism.
Errors (%)	91.7	87.5	95.8	90.6	92.7	84.4	99.0

From the error-percentages in Table 2 it is obvious that the 12 six year old children produced incorrect judgments in most cases.

Comparing the two experiments, we can see that the 6 year old Dutch children in this study interpreted the different sentences - and thus obviously also the different anaphoric pronouns - in one and the same way. They considered those pairs as matches when the picture presented a self-oriented action and the sentence contained an anaphoric pronoun irrespective of whether this pronoun was reflexive or non-reflexive. Both sentence types were interpreted as having a coreferential relationship between the pronoun and the agent in the sentence.

2.3 Experiment III: Developmental changes in the interpretation of anaphora

Since the first two experiments looked only at six year olds, the results do not indicate any developmental changes. In order to allow age-comparisons, a third experiment was conducted which included subjects of three different age-groups: again a group of six-year olds, a group of seven year olds and also a group of adults, included for comparison. In addition to comparing different age-groups Experiment III also differs from I and II in another respect. Whereas the test-sentences were homogeneous in so far as they contained only reflexive pronouns (Experiment I) or only non-reflexive

pronouns (Experiment II), the test-sentences of Experiment III were of both types, presented in random order. This variation allows us to test whether the homogenity of the test-sentences is important for children's interpretation of anaphoric expressions. It is conceivable that 6 year old children, for example, use a consistent strategy for the interpretation of sentence-internal anaphora only if the pronominal forms belong to the same pronoun class (excluding differences in gender marking). The exposure to mixed classes of pronouns might induce a conflict in the children's interpretation. They might become aware of the different classes of pronouns - here reflexives vs. non-reflexives - and therefore assume that form differences could also imply differences in interpretation.

Results and Interpretation

The results of Experiment III are summarized in Table 3, which contains the percentages of incorrect judgments for the different factors which were varied in the experiment. Let us consider first the distribution of errors for the 15 six year olds investigated. Overall, 33% of their judgments were wrong. In contrast to the results of the previous experiments the errors were not limited to

Table 3 Distribution of errors in Experiment III

	Pronoun Type		Gender		Linear Order		Response Category	
	Reflex.	Non-refl.	♂	♀	Prep.	Poss.	Match	Mism.
6 yr olds	28.7	37.9	30.4	36.2	33.7	32.9	13.8	52.9
7 yr olds	9.2	48.3	22.0	35.5	28.0	29.5	17.1	40.4
Adults	1.3	8.7	2.5	7.5	4.4	6.6	7.5	2.5

a particular type, but are spread over the different factors of the experiment. In this experiment the six year old children misinterpreted reflexive sentences (28.7%) as well as non-reflexive ones (37.9%). This effect is presumably due to the use of heterogeneous lists of test-sentences which prevented the children from interpreting all pronouns, irrespective of their type, as if they were reflexives. They clearly did not use this strategy in Experiment III, since their errors now occur in either direction. Their judgments show an obvious uncertainty about the interpretation of the test-sentences, and the error rate is not statistically significant between the two sentence types (McNemar test, $p \leq 0.34$).

The results of the 15 seven year olds show that the proportion of wrong judgments is only slightly lower than that of the six year olds (28.8% vs. 33.3%), but the error-distribution is quite different. The errors for the reflexive sentences (9.2%) decreased by about 20%. The difference is statistically significant ($Chi^2 = 4.88/1$, $p \leq 0.01$). With only one exception the errors always involved the mismatch-pairs. The error rate in the sentences with the non-reflexive pronouns, increased by about 10% for the seven year olds,

but this difference is not significant statistically ($Chi^2 = 0.00/1$, $p \leq 1.00$). Twice as many errors occurred with the feminine pronoun form haar (her) as with the masculine form hem (him). Likewise, the errors for mismatches are twice as many as for matches. As in the previous two experiments, the linear order of the antecedents had almost no effect on errors (28% for the prepositional construction as compared to 29.5% for the possessive construction).

When one compares the results of the six and seven year olds in Experiment III, the following main difference appears: the developmental progress in terms of a decrease of errors can be seen for the sentences containing reflexive pronouns, but not for the sentences containing non-reflexive pronouns. Furthermore, in both age-groups the percentage of error judgments is clearly affected by the response-category.

Among the 320 judgments of the ten adult subjects investigated there were only 16 errors (5%), primarily due to just one subject.

3. Conclusions

The present study provides some evidence that the discovery of the relationship between a reflexive pronoun and its antecedent is easier for the child than the discovery of the relation between a non-reflexive anaphoric pronoun and its antecedent. However, our general hypothesis that the structural differences between these two pronoun types are reflected in the acquisition in a clear-cut sequential order is obviously too simple. The data and the developmental changes in them are considerably more complex than we expected.

Comparing the three experiments, the results show that the six year olds' interpretation of anaphoric pronouns is quite inconsistent, since these children apply a consistent strategy of interpretation for the sentence-picture pairs with homogeneous lists of test-sentences, but not for mixed lists, where both types of pronouns occur. Furthermore, the errors in the experiments suggest that children first interpret the positive cases correctly, where sentences and pictures match, and only later where they mismatch (for a related discussion about children's theory formation, see Karmiloff-Smith & Inhelder, 1974/5, Piaget, 1978).

The interpretation of sentences with reflexives seems to have been mastered by seven year olds, but the interpretation of sentences containing non-reflexives is still quite inconsistent. In order to study the progress of the latter pronoun type, it is necessary to go beyond the single sentence unit, since non-reflexive personal pronouns not only function sentence-internally, but also intersententially (see Hickmann, 1980 and Karmiloff-Smith, 1981).

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References

Clark, E.V. (1978): From gesture to word: On the natural history of deixis in language acquisition. In: J.S. Bruner and A. Garton (eds.), Human Growth and Development. Oxford: Oxford University Press.

Chomsky, C.S. (1969): The Acquisition of Syntax in Children from 5 to 10. Cambridge, Mass.: MIT Press.

Chomsky, N. (1981): Lectures on Government and Binding. In Pisa Lectures. Dordrecht: Foris.

Deutsch, W. and Pechmann, T. (1978): Ihr, dir, or mir? On the acquisition of pronouns in German children. Cognition, 6, 155-168.

Hickmann, M. (1980): Creating Referents in Discourse: A Developmental Analysis of Linguistic Cohesion. In: J. Kreiman and A. Ojeda (eds.), Papers from the parasession on Pronouns and Anaphora. Chicago, Ill.: Chicago Linguistic Society.

Karmiloff-Smith, A. and Inhelder, B. (1974/5): If you want to get ahead get a theory. Cognition, 3, 195-212.

Karmiloff-Smith, A. (1981): The grammatical marking of thematic structure in the development of language production. In: W. Deutsch (ed.), The Child's Construction of Language. London: Academic Press.

Koster, J. (1978): Locality Principles in Syntax. Dordrecht: Foris.

Koster, J. (1979): Anaphora: an introduction without footnotes. Nijmegen: Filosofisch Instituut, Report DA-01-79.

Partee, B. (1978): Bound variables and other anaphors. In: Theoretical Issues in Natural Language Processing - 2. Urbana-Champaign: University of Illinois.

Piaget, J. (1978): Success and Understanding. Cambridge, Mass.: Harvard University Press.

Solan, L. (1978): Anaphora in Child Language. Ph.D. Dissertation. Amherst, Mass.

Tanz, Ch. (1980): Studies in the Acquisition of Deictic terms. Cambridge: Cambridge University Press.